# Astrid Boje | Curriculum Vitae

Churchill College, Storeys Way, Cambridge, Cambridgeshire, CB3 0DS

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Graduate chemical engineer with a dual masters in mathematics and scientific computing. Currently a Ph.D. student in the Computational Modelling group at the University of Cambridge, working with stochastic methods for solving population balance equations. Interested in applying stochastic simulation techniques and data informed surrogate models to solve materials design problems.

## Experience

### Work experience

- **University of Cambridge** — **Cambridge, United Kingdom**
  *Ph.D. Candidate in Chemical Engineering and Biotechnology* — *2015–2019*
  Develop Monte Carlo methods (in-house code written in C++) to solve population balance equations for studying combustion synthesis of inorganic nanoparticles. Proposed reactor model for titanium dioxide synthesis and numerical algorithms to improve performance of the stochastic solver under industrial conditions.

- **Helmholtz Zentrum Dresden Rossendorf** — **Dresden, Germany**
  *Intern in Experimental Thermal Fluid Dynamics* — *2014*
  Developed 1D, dynamic, multicomponent model for a slurry bubble column reactor for Fischer-Tropsch synthesis.

- **Mintek** — **Johannesburg, South Africa**
  *Graduate Engineer in Measurement and Control* — *2013*
  Researched viability of thickener control. Documented models developed for the in-house control framework (written in C++). Contributed to on-site testing and data analysis for a flotation reagent controller.

- **Mintek** — **Johannesburg, South Africa**
  *Engineering Intern in Measurement and Control* — *2011–2012*
  Developed a temperature-dependent amperometry model for inclusion in a commercial cyanide measurement device.

### Teaching experience

- **University of Cambridge** — **Cambridge, United Kingdom**
  *Supervisor for Partial Differential Equations Course* — *2019*
  Small-group teaching and tutorials for students in the Part IIA year of the Chemical Engineering Tripos.

## Academic qualifications

- **Churchill College, University of Cambridge** — **Cambridge, United Kingdom**
  *Ph.D. Chemical Engineering* — *2015–Current*
  Thesis using stochastic techniques to model combustion synthesis in joint industrial project with Venator for better understanding of the titanium dioxide process. Some research work conducted at the Cambridge CARES facilities at the National University of Singapore.
  Supervisor: Prof. Dr. Markus Kraft.

- **Technical University of Berlin (TUB)** **Berlin, Germany**
  *M.Sc. Scientific Computing, 1.2, "Sehr Gut"* *2014–2015*
  Coursework covered control theory, differential algebraic equations, optimal control of partial differential equations, and model order reduction. Thesis on convergence of stochastic coagulating particle systems with Weierstrass Institute of Applied Analysis and Stochastics (WIAS).
  Supervisors: Dr. Robert Patterson (WIAS) and Prof. Dr. Wolfgang König (TUB, WIAS).

- **Royal Institute of Technology (KTH)** **Stockholm, Sweden**
  *M.Sc. Mathematics, A, "Excellent"* *2013–2014*
  Coursework covered stochastic differential equations, parallel and high-performance computing, fast numerical algorithms, mathematical modelling, finite element and finite volume methods, and non-linear optimisation.

- **University of Cape Town (UCT)** **Cape Town, South Africa**
  *B.Sc. Eng. Hons. (Chemical Engineering), First Class* *2009–2012*
  Coursework included mathematics, physics, chemistry, thermodynamics, numerical methods, process design, modelling, and control, and post-graduate level coursework in optimisation. Honours project modelling Fischer Tropsch synthesis.
  Supervisor: Prof. Dr. Klaus Moller.

## Technical and personal skills

- **Programming languages:** MATLAB/SCILAB, PYTHON, and C++. Basic proficiency with MPI/OpenMP and parallel programming.
- **Simulation software:** ASPEN HYSYS, COMSOL MULTIPHYSICS, waLBERLA (Lattice-Boltzmann solver for fluid dynamics).
- **General:** Linux, Microsoft Windows, LaTeX, Git.

## Interests and extra-curricular activity

- **Cambridge University Ballet Club** (2015–2016, 2018–2019). Performed in Don Quixote, 2019.
- **Churchill College Boat Club** (2015–2016, 2018–2019). Rowed in women's second boat, 2015–2016. Sub for women's first and second boats, 2018–2019.

## Publications

- BOJE, A., AKROYD, J., KRAFT, M., 2019. A hybrid particle-number and particle model for efficient solution of population balance equations. *Journal of Computational Physics, Accepted for Publication*.
- BOJE, A., AKROYD, J., SUTCLIFFE, S., EDWARDS, J., KRAFT, M., 2017. Detailed population balance modelling of $TiO_2$ synthesis in an industrial reactor. *Chemical Engineering Science* 164, 219–231. doi: 10.1016/j.ces.2017.02.019.

## Conference talks

- BOJE, A., AKROYD, J., KRAFT, M., 2018. Numerical study of the evolution of particle size and morphology in an industrial titanium dioxide reactor. American Institute of Chemical Engineers (AIChE) Annual Meeting.

## Conference posters

- BOJE, A., KRAFT, M., 2017. Computational study of temperature effects in $TiO_2$ synthesis in an industrial reactor. Cambridge Particle Meeting.

## Achievements

- **Cambridge University Ph.D. Studentships** *2016–2019*
  Cambridge Centre for Advanced Research and Education in Singapore (CARES)
  Chemical Engineering and Biotechnology Department
- **COSSE Double Masters Programme** *2013–2015*
  Erasmus Mundus Scholarship
- **Mintek** *2011–2012*
  Undergraduate Bursary
- **University of Cape Town, Faculty of Engineering** *2009–2012*
  Entrance Scholarship (2009), Dean's Merit List (2010–2012)
- **Independent Examinations Board (IEB)** *2008*
  Top 40 IEB Matriculants in South Africa
- **Our Lady of Fatima Convent School** *2008*
  Matric DUX student and subject trophies: English, Afrikaans, Bilingualism, Physics, Biology, Mathematics and Physics, History, Life Orientation
- **Kwa-Zulu Natal Youth Dance Company** *2006–2008*
  Provincial ballet dancer.

## Languages

- **First language**: English
- **Intermediate proficiency**: Afrikaans
- **Basic proficiency**: Italian (A1&2 CEFR), German, Swedish